

Claims

1. Plane-parallel structures of silicon/silicon oxide, obtainable by heating plane-parallel structures of SiO_y in an oxygen-free atmosphere at a temperature above 400 °C, wherein $0.70 \leq y \leq 1.8$, or plane-parallel structures of silicon/silicon oxide, obtainable by heating plane-parallel structures of SiO_x in an oxygen-free atmosphere at a temperature above 400 °C, wherein $0.03 \leq x \leq 0.95$, especially $0.05 \leq x \leq 0.50$, very especially $0.10 \leq x \leq 0.30$.
- 10 2. A plane-parallel pigment, comprising a silicon/silicon oxide layer, obtainable by heating a SiO_y layer in an oxygen-free atmosphere at a temperature above 400 °C, wherein $0.70 \leq y \leq 1.8$, or a plane-parallel pigment, comprising a silicon/silicon oxide layer, obtainable by heating plane-parallel structures of SiO_x , wherein $0.03 \leq x \leq 0.95$, especially $0.05 \leq x \leq 0.50$, very especially $0.10 \leq x \leq 0.30$.
- 15 3. A pigment according to claim 2, wherein the silicon/silicon oxide layer; obtainable by heating a SiO_y layer in an oxygen-free atmosphere at a temperature above 400 °C, forms the core of the pigment; wherein $0.70 \leq y \leq 1.8$.
- 20 4. A pigment according to claim 3, comprising a further layer of a dielectric material having a "high" refractive index.
- 25 5. A pigment according to claim 4, wherein the dielectric material is selected from silicon carbide (SiC), zinc sulfide (ZnS), zinc oxide (ZnO), zirconium oxide (ZrO_2), titanium dioxide (TiO_2), carbon, indium oxide (In_2O_3), indium tin oxide (ITO), tantalum pentoxide (Ta_2O_5), cerium oxide (CeO_2), yttrium oxide (Y_2O_3), europium oxide (Eu_2O_3), iron oxides such as iron(II)/iron(III) oxide (Fe_3O_4) and iron(III) oxide (Fe_2O_3), hafnium nitride (HfN), hafnium carbide (HfC), hafnium oxide (HfO_2), lanthanum oxide (La_2O_3), magnesium oxide (MgO), neodymium oxide (Nd_2O_3), praseodymium oxide (Pr_6O_{11}), samarium oxide (Sm_2O_3), antimony trioxide (Sb_2O_3), silicon monoxides (SiO), selenium trioxide (Se_2O_3), tin oxide (SnO_2), tungsten trioxide (WO_3) and combinations thereof, especially TiO_2 , ZrO_2 , Fe_2O_3 , Fe_3O_4 , Cr_2O_3 , ZnO , or a mixture of those oxides, or an iron titanate, an iron oxide hydrate, a titanium suboxide or a mixture or mixed phase of those compounds.
- 30 6. A pigment according to claim 2 comprising in this order:

(a) a silicon/silicon oxide layer obtainable by heating a SiO_y layer in an oxygen-free atmosphere at a temperature above 400 °C,

(b) a reflective layer, especially a metal layer, and

(c) a silicon/silicon oxide layer obtainable by heating a SiO_y layer in an oxygen-free atmosphere at a temperature above 400 °C, wherein $0.70 \leq y \leq 1.8$.

5 7. A pigment according to claim 2, wherein the pigment comprises in this order:

(a2) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

10 (b2) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.80}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

(c2) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, or

the pigment comprises in this order:

15 (a3) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.80}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

(b3) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

20 (c3) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.80}$ layer in an oxygen-free atmosphere at a temperature above 400 °C.

8. A pigment according to claim 2, wherein the pigment comprises in this order:

(a4) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

25 (b4) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.8}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

(c4) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C and optionally further layers, or
the pigment comprises in this order:

30 (a5) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

(b5) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

35 (c5) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C and optionally further layers, or
the pigment comprises in this order:

(a6) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

(b6) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

5 (c6) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.70-0.99}$ layer in an oxygen-free atmosphere at a temperature above 400 °C and optionally further layers, or the pigment comprises in this order:

(a7) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.80}$ layer in an oxygen-free atmosphere at a temperature above 400 °C,

10 (b7) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{0.03-0.69}$ layer in an oxygen-free atmosphere at a temperature above 400 °C, and

(c7) a silicon/silicon oxide layer obtainable by heating a $\text{SiO}_{1.00-1.80}$ layer in an oxygen-free atmosphere at a temperature above 400 °C and optionally further layers.

15 9. A composition comprising a high molecular weight organic material and from 0.01 to 80 % by weight, preferably from 0.1 to 30 % by weight, based on the high molecular weight organic material, of a pigment according to any one of claims 2 to 8.

10. A cosmetic preparation or formulation comprising from 0.0001 to 90 % by weight of the plane-parallel structures of silicon/silicon oxide according to claims 1 or the pigment according to any one of claims 2 to 8 and from 10 to 99,9999 % of a cosmetically suitable carrier material, based on the total weight of the cosmetic preparation or formulation.

20 11. Use of a pigment according to any one of claims 2 to 8, in ink-jet printing, for dyeing textiles, for pigmenting surface coatings, printing inks, plastics, cosmetics, glazes for ceramics and glass.

25 12. A method of producing plane-parallel structures of silicon/silicon oxide, comprising the steps:

30 a) vapour-deposition of a separating agent onto a movable carrier to produce a separating agent layer,

b) vapour-deposition of an SiO_y layer onto the separating agent layer,

c) dissolution of the separating agent layer in a solvent,

35 d) separation of the SiO_y from the solvent, wherein $0.70 \leq y \leq 1.8$, and

e) heating the SiO_y in an oxygen-free atmosphere to a temperature above 400°C.